Selection of appropriate planting area for ensuring foods of large-bodied natatorial birds

Hitomi OBARA, Natsuki YOSHIKAWA, Marie OGASA, Susumu MIYAZU, Shin-ichi MISAWA

1. Study background and objectives

The Niigata Prefectural government, with its comprehensive land planning (Regulation of the environment) in the high-risk area (NT) as the target area, selected the large-bodied natatorial birds. Due to the high-risk area (NT) as the target area, low water levels and the lack of water, the water level has been reduced. By observation, the water level of the water level was observed at 1.0m below the ground level, and the water level was measured. The water level was observed at 1.0m below the ground level, and the water level was measured. The water level was observed at 1.0m below the ground level, and the water level was measured. The water level was observed at 1.0m below the ground level, and the water level was measured.

2. Study area

The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains.

3.1 Macrophylus Environment

The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains.

3.2 Shallow Measurement Survey

The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains.

3.3 Stream Flow Measurement Survey

The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains.

4. Modeling of Flow Distribution

The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains. The study area is the north of Niigata Prefecture, 193 ha in size, and includes various environments such as wetlands, forests, and mountains.
福島湖の湖流の計算には、運動方程式および連続式からなる2次元の浅水流方程式を用いた。また、計算格子には福島湖の複雑な形状を再現するため、局所的に解像度を高めることができるQuadtree格子を採用した。福島湖への流入量は、Kinematic Wave法によって求めた。流出河川の新井郷川を1次元安定流モデルで表現し、湖との接続部である最上流メッシュの計算流量を湖からの流出量とした。

4.2 モデルの再現性
現地調査によって得られた流向および流速の実測値とモデルの計算値を比較した（図2）。その結果、計算値は実測値を概ね再現した。

5. マコモの生育適地の選定
①水深（標高値）による選定および②流速による選定を行い、両適地を重ね合わせてマコモの生育適地を選定した。

5.1 水深（標高値）による選定
現地調査および空中写真からの判別によって、現存するマコモは、調査時の福島湖の平均水位（T.P.-0.71）を基準とした。比高-20cm～35cmの領域に分布することが明らかになった。この領域の標高はT.P.-0.85m～-0.45mであることから、この条件を水深の観点からの植栽適値とした。

5.2 流速による適地の選定
流向流速調査期間中の無降雨日において、潟沼筋地点で観測された1時間の平均流速が最大であった期間の湖全体の平均流速分布を潟沼流動モデルによって再現した。流速分布とマコモの生育分布を重ねた結果、マコモの生育分布の大半は流速3cm/s以下であったため、この条件を植栽適地とした。

5.3 標高および流速による適地の検討
マコモの生育適した水深条件および流速条件を満たす領域を図3に示す。陸域では29.8ha、水域では3.2haの適地が存在し、主に潟東側の内部に広がっていることが示唆された。現在、マコモの生育範囲は3.9haであるため、こうした領域で植栽を行えば、湖全体で現存の約7.5倍の生育領域の増加を期待できる。

6. まとめ
湖沼水流動モデルを構築し、水深と流速の観点から、マコモの生育適地を選定した。その結果、T.P.-0.85m～-0.45mかつ流速3cm/s以下での領域が生育適地であると示唆された。潟東側の内部に適した環境があると考えられるが、現状では、乾燥に強いヨシ群落が卓越している。今後は土壌環境および湖内の水位変動等を考慮した検討を行う予定である。

参考文献
1) 猪野裕章・石澤進（2002）：福島湖の植物層と植生、福島湖植物調査報告書